DOCUMENT RESUME

ED 479 632 IR 022 236

AUTHOR	Woelk, Darrell; Agarwal, Shailesh
TITLE	Integration of E-Learning and Knowledge Management.
PUB DATE	2002-10-00
NOTE	9p.; In: E-Learn 2002 World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education. Proceedings (7th, Montreal, Quebec, Canada, October 15-19, 2002); see IR 022 093.
AVAILABLE FROM	Association for the Advancement of Computing in Education (AACE), P.O. Box 3728, Norfolk, VA 23514. Tel: 757-623-7588; e-mail: info@aace.org; Web site: http://www.aace.org/DL/.
PUB TYPE	Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS
DESCRIPTORS	*Computer Assisted Instruction; *Corporate Education; *Distance Education; *Educational Technology; Information Management; Instructional Design; Job Training; Postsecondary Education; Professional Development
IDENTIFIERS	*Knowledge Management

ABSTRACT

E-Learning technology today is used primarily to handcraft training courses about carefully selected topics for delivery to employees registered for those courses. This paper investigates the integration of e-learning and knowledge management technology to improve the capture, organization and delivery of both traditional training courses and large amounts of corporate knowledge. First, a model is proposed for the phases of knowledge management. That model is then enhanced with concepts and technology from e-learning. The model is then used to illustrate four real world scenarios that add increasing amounts of knowledge management to an e-learning environment. Analysis of these four scenarios will help provide better understanding of the practical relationship between knowledge management and e-learning. (Author/AEF)

Reproductions supplied by EDRS are the best that can be made
from the original document.

Integration of e-Learning and Knowledge Management

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

C.H. Marks

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

28

Darrell Woelk
Elastic Knowledge
United States
dwoelk@elasticknowledge.com

Shailesh Agarwal, Ph.D
Docent Inc.
United States
sagarwal@docent.com

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Abstract: e-Learning technology today is used primarily to handcraft training courses about carefully selected topics for delivery to employees registered for those courses. On the other hand, knowledge management technology is used to rapidly capture, organize and deliver large amounts of corporate knowledge. This paper investigates the integration of e-learning and knowledge management technology to improve the capture, organization and delivery of both traditional training courses and large amounts of corporate knowledge. First, a model is proposed for the phases of knowledge management. That model is then enhanced with concepts and technology from e-learning. The model is then used to illustrate four real world scenarios that add increasing amounts of knowledge management to an e-learning environment. Analysis of these four scenarios will help to better understand the practical relationship between knowledge management and e-learning.

ED 479 632

1. Phases of Knowledge Management

One way of understanding the impact of knowledge management on a corporation or government organization is to look at the knowledge management lifecycle and the flow of knowledge in the organization. Nonaka and Takenuchi (Nonaka & Takenuchi 1995) have investigated the relationship between tacit knowledge and explicit knowledge and have described four phases of knowledge conversion: Socialization, Externalization, Combination and Internalization. The goal of the implementation of knowledge management in an organization is to increase the amount of tacit knowledge that an individual has available to apply to solving business problems. This suggests that there is a fifth phase, Application, which is the application of knowledge that has been exchanged through the other phases (Frappaolo & Toms 1997). These five phases are described below and illustrated in (Fig. 1).

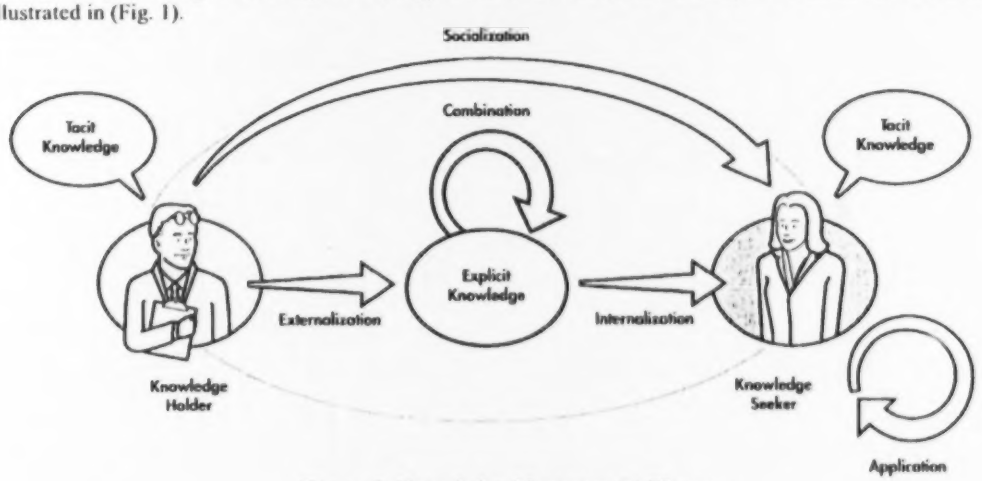

Figure 1: Knowledge Management Phases

IR022236

BEST COPY AVAILABLE

- **Socialization:** Transfer tacit knowledge from one person to another person
- **Externalization:** Translate tacit knowledge into explicit knowledge in a repository
- **Combination:** Combine different bodies of explicit knowledge to create new explicit knowledge
- **Internalization:** Extract the explicit knowledge from a repository that is relevant to a particular person's need and deliver it to that person where it is translated into tacit knowledge
- **Application:** Apply tacit knowledge to a business problem

2. e-Learning Enhancements to Knowledge Management

e-Learning technology has been evolving separately from knowledge management technology. There have been recent investigations into the integration of these technologies (Barron 2000) (Allee 2000). e-Learning technology will enhance the effectiveness of each of the five phases of knowledge management as shown below. A sixth phase, Feedback, has also been added.

- **Socialization:** Competency and skills measurements help identify the people with specific interests, skills and knowledge in the organization.
- **Externalization:** Knowledge is captured by the system with the intent of teaching that knowledge to other people. This improves the knowledge capture process.
- **Combination:** Knowledge about products and processes of the business is organized to make learning the knowledge more effective and efficient. Pedagogical techniques are embedded in the knowledge.
- **Internalization:** Competency and skills measurements help identify which people lack the knowledge to do their job effectively and provide them with online training. e-Learning will insure that a person has learned the knowledge using assessments and alternative learning methods, if necessary.
- **Application:** People can be provided with on demand performance support by getting just the training that they need at the time that they need it to complete a business task.
- **Feedback:** Assessments provide feedback concerning how well a person has learned and how well they have applied what they learned to a business problem.

(Fig. 2) is a modified and more detailed version of (Fig. 1) that represents the knowledge management phases with e-learning enhancements. In (Fig. 2), a Knowledge Holder can either transfer tacit knowledge to a Knowledge Seeker through socialization or create explicit knowledge and store it in a knowledge repository. The Knowledge Organizer in (Fig. 2) is a person (or software program) who relates the created knowledge to other knowledge in the repository or further refines the created knowledge. The Instructional Designer is a person (or software program) who organizes the learning of the knowledge by adding pre-assessments, additional learning aids, and post-assessments. The Knowledge Seeker then learns the explicit knowledge through an online guided learning experience. The Knowledge Seeker then uses the knowledge gained through socialization or internalization to make decisions and perform tasks in the enterprise. The performance of the Knowledge Seeker on these decisions and tasks is measured and returned to the knowledge repository as feedback that can be used to help determine if the skills have been learned and to suggest additional e-learning experiences.

The implementation of these knowledge management phases with e-learning enhancements will require new advancements in technology. The application of new technologies such as semantic web services, competency ontologies, business process integration and intelligent software agents within an enterprise is discussed in (Woelk 2002). The application of these technologies across multiple corporations, educational institutions and community organizations in support of performance-based lifelong learning is discussed in (Woelk & Lefrere 2002).

3. Business Scenarios

This section illustrates the integration of knowledge management and e-learning through the use of a series of four business scenarios. The scenarios represent the addition of increasing amounts of knowledge management concepts and technology to an e-learning environment.

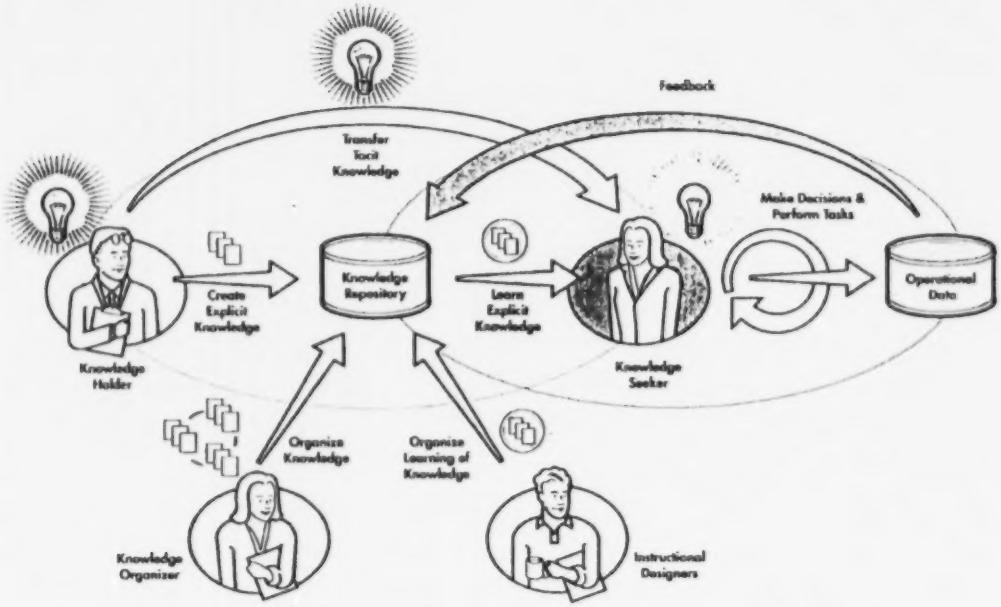

Figure 2: Knowledge Management Phases with e-Learning Enhancements

The first three scenarios concentrate on increasing the effectiveness of the performance of employees in meeting the objectives of the company. This requires that an employee receive the *right knowledge* at the *right time* and *just enough* knowledge that they need to execute effectively. The *right knowledge* that an employee needs is determined by their role in the company and the products and processes in which they are partic ipating. The *right time* to receive that is knowledge is when they need it for a specific task. *Just enough* knowledge is whatever they need and nothing more. The fourth scenario concentrates on the ability of a large publisher, such to meet the future demands for the publishing of large amounts of digital information.

3.1. Business Scenario 1: Traditional e-Learning

Scenario 1 is shown in (Fig. 3). A large company has 1000 worldwide salespeople who sell 100 products. There are 1000 engineers and marketing people who create and release 5 new products (or product enhancements) per month. There are 5 instructional designers who collectively build 2.5 online courses per month that are used to train salespeople on new and modified products. These are simple 2 hour courses that concentrate on information transfer rather than skill development. Instructional designers will typically talk to engineers and marketing people to find existing online content or to learn enough to create the learning content themselves. Learning objects (Longmire 2000) are created that may be stored in a Learning Object Repository so that they can be reused in other courses. This helps when new courses are created for existing products but does not help much when courses are created for new products.

The company encounters the following problems with Scenario 1:

- There is content that the instructional designers don't know about that could be used in courses.
- There is content that the instructional designers know about but they can't find. Even if they find content, it might be incorrect.
- Instructional designers don't have time to talk to all of the engineers and marketing people so they produce fewer courses.
- The 5 instructional designers can only build a total of 2.5 courses per month so some products introduced each month no not have a training course.

BEST COPY AVAILABLE

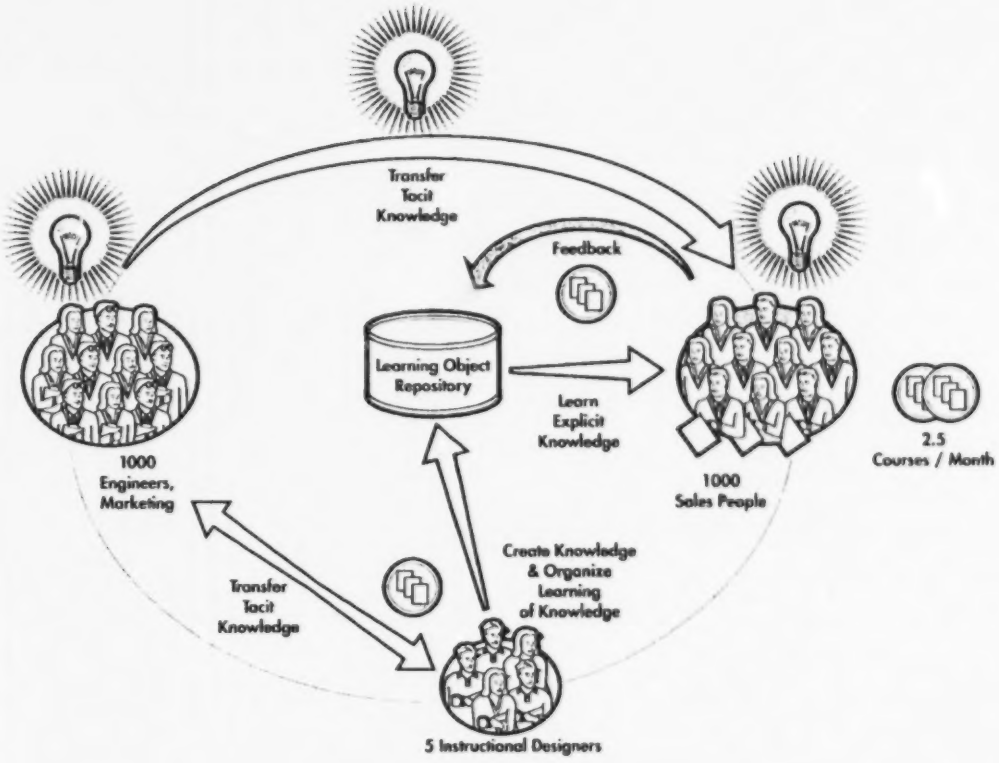

Figure 3: Scenario 1: Traditional e-Learning

3.2. Business Scenario 2: e-Learning Based on Enterprise Content

Scenario 2 is shown in (Fig. 4). In this scenario, the company uses a Content Management System to create, store and update the content about new products from the 1000 engineering and marketing people. This increases the effectiveness of the instructional designers because they can build learning objects by finding and reusing the content created by engineering and marketing. By building learning objects in this manner, the content of the learning objects can automatically be updated when the content in the Content Management System is updated. These improvements will enable the 5 instructional designers to create a total of 5 courses per month.

However, the company encounters the following problems with Scenario 2:

- Courses are created using smaller, reusable learning objects, but entire courses, not individual learning objects, are delivered to sales people.
- People in the company are creating knowledge about the products that is not being embedded in the courses. Email messages, memos, sales call notes, audio messages, meeting notes, product recalls, customer support problem reports, personnel and strategy changes at customer companies, etc. all contain knowledge that would make the sales person more effective.
- Sales people either never know that this knowledge exists or they spend valuable time interacting directly with engineering, marketing and other sales people to find the knowledge. Even then, they might interact with the wrong person and get the wrong information.

BEST COPY AVAILABLE

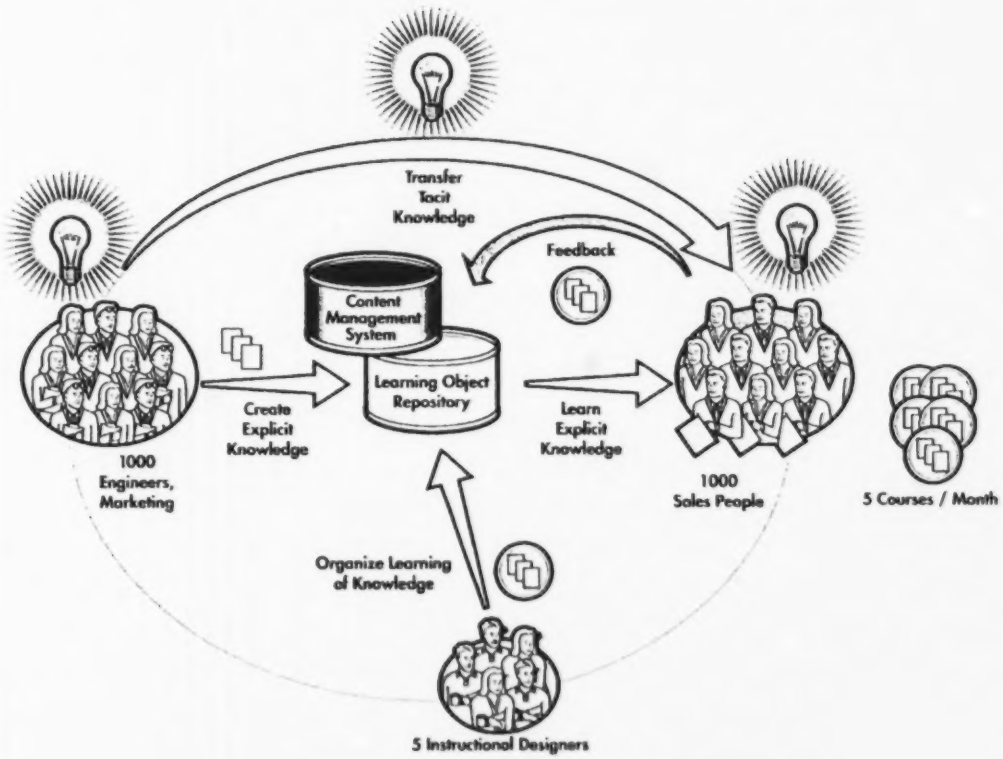

Figure 4: Scenario 2: e-Learning Based on Enterprise Content

3.3. Business Scenario 3: e-Learning Based on Enterprise Knowledge

Scenario 3 is shown in (Fig. 5). In this scenario, e-learning in the company leverages not only the content in the Content Management System, but also the knowledge that has been captured in a Knowledge Management System. This knowledge includes email messages, memos, sales call notes, audio messages, meeting notes, product recalls, customer support problem reports, personnel and strategy changes at customer companies that were mentioned in the previous section. But the knowledge also includes information on the roles, skills, expertise and performance of individual employees that will simplify the transfer of tacit knowledge and explicit knowledge to the sales person. This knowledge will enable the sales person to find the right learning objects and to contact the right people for tacit knowledge that is needed to be effective. The key to finding the right content and the right people from the multiple information sources in (Fig. 5) is an ontology containing a metadata representation of the concepts, relationships and processes of the enterprise. Progress is being made in the standardization of ontology representations (World Wide Web Consortium 2002). An enterprise ontology can provide a gateway to multiple information sources that can be navigated by people and software agents (Lenat 1995) (Woelk & Tomlinson 1994).

In this scenario, knowledge will be delivered through a variety of presentation devices including web browsers, PDA's and cell phones. This enables the sales person to receive the knowledge when it is needed regardless of where they are and what they are doing. e-Learning will be delivered as small, focused learning objects to fit the format of the presentation devices.

(Fig. 5) shows that the role of the Instructional Designer is still to organize the learning of the knowledge. But the Instructional Designers will be more efficient because the authoring systems will be more intelligent and the knowledge will be better organized. This organization of the knowledge will be the responsibility of Knowledge

BEST COPY AVAILABLE

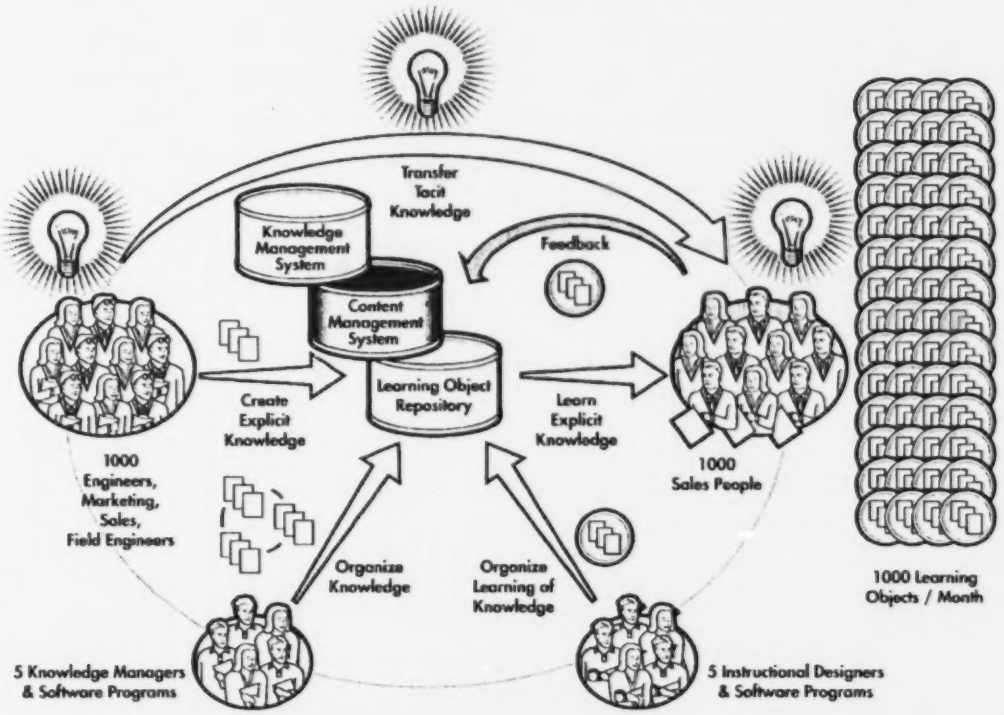

Figure 5: Scenario 3: e-Learning Based on Enterprise Content and Knowledge

Managers and automated software programs. In this scenario, 5 Knowledge Managers and 5 Instructional Designers will be able to create 1000 learning objects per month.

3.4. Business Scenario 4: Digital Publishing

Scenario 4 is shown in (Fig. 6). A large publishing company has 1000 independent authors who contribute content and knowledge to be published to a mass audience of millions of people and institutions. The contributions are in the form of knowledge objects that may be either full books, training courses or smaller pieces of knowledge. The publishing company has Knowledge Editors who organize and correlate the contributions to make them easy to find. The publishing company also has 5 Instructional Designers who may further organize some of the knowledge in order to publish it as e-learning. These authors, knowledge managers and instructional designers will be able to publish a total of 1000 learning objects per month.

This is similar to Scenario 3 except that there are additional issues:

- Knowledge is being transferred across multiple companies and individuals rather than within a single company. This includes thousands of authors and millions of readers.
- The traditional security issues of authentication, authorization, integrity, confidentiality, audit and accountability must be dealt with in a geographically distributed environment.
- The issue of digital rights management must be solved:
  - Ownership of content
  - Rights to use that content in specified contexts
  - Appropriate payment for the use of those rights
  - Security and protection required to enforce those rights
  -

BEST COPY AVAILABLE

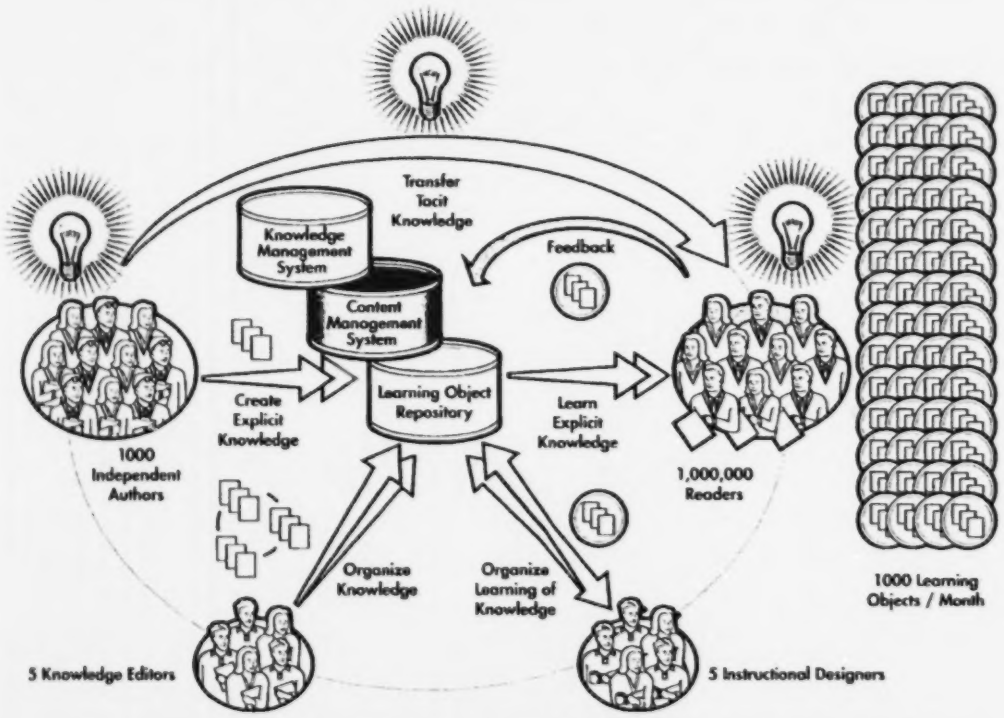

Figure 6: Scenario 4: e-Learning Based on Content and Knowledge from Independent Authors

- Information about the knowledge that readers already have will be used to identify the knowledge that they wish or need to acquire. This information will exist in a broad number of places such as university records systems, military training histories, company training histories and corporate ERP and HR systems.

4. Conclusions

This paper has illustrated how e-learning techniques and technology can be used to enhance knowledge management in an enterprise and provide the benefits of both. First, a model was presented for the integration of e-learning and knowledge management. The model was then applied to some real world scenarios to illustrate the benefits of this integration. These scenarios also provide a roadmap for the evolution of new systems that will provide both the efficient capture of knowledge and the efficient delivery of knowledge.

References

Nonaka, I. and H. Takeuchi (1995). *The Knowledge-Creating Company*, Oxford Univ. Press, NY.

Frappaolo, C. and W. Toms (1997). "Knowledge Management: From Terra Incognito to Terra Firma", The Delphi Group, http://www.delphigroup.com/articles/1997/11071997KMThoughtMgmt.html.

Barron, T. (2000). "A Smarter Frankenstein: The Merging of E-Learning and Knowledge Management", ASTD Learning Circuits, http://www.learningcircuits.org/aug2000/barron.html.

Allee, V. (2000). "eLearning is Not Knowledge Management", http://www.linezine.com/2.1/features/vaenkm.htm

Longmire, W. (2000). "A Primer on Learning Objects", ASTD Learning Circuits, http://www.learningcircuits.org/mar2000/barron.html.

World Wide Web Consortium Web Ontology Group. (2002). http://www.w3.org/2001/sw/WebOnt.

BEST COPY AVAILABLE

Lenat, D. (1995). "CYC: A Large-Scale Investment in Knowledge Infrastructure", Nov. 1995, Vol. 38 No. 11, Communications of the ACM.

Woelk, D. and C. Tomlinson. (1994). "The InfoSleuth Project: Intelligent Search Management via Semantic Agents", Second International World Wide Web Conference.

Woelk, D. (2002) "E-Learning, Semantic Web Services and Competency Ontologies", Proceedings of ED-MEDIA World Conference on Educational Multimedia, Hypermedia and Telecommunications, Denver, Colorado. June 2002.

Woelk, D and P. Lefrere (2002) "Technology for Performance-Based Lifelong Learning", to appear in the International Conference on Computers in Education (ICCE 2002), Auckland, New Zealand. December, 2002.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

[X] This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

[ ] This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").